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Planetary wave activity and rotational effects in the mid-latitudes of the lower and middle atmosphere (0-100KM)

Fahrutdinova A., Guryanov V., Korotyshkin D., Manson A., Meek C., Jacobi C., Kürschner D.
Kazan Federal University, 420008, Kremlevskaya 18, Kazan, Russia

Abstract

Investigation of the wind regime during solstices (1998-1999) allowed the presentation of the vertical structure of the intensity of planetary waves in the zonal and meridional wind. The seasonal dependence of the vertical structure of these planetary wave amplitudes is determined at middle atmosphere heights. Daily mesosphere/lower thermosphere (MLT) experimental data, measured at Collm (52N 15E, LF D1 radar), Kazan (56N 49E, meteor radar) and Saskatoon (52N 103W, MF radar) in the height range 80-100 km, and UKMO assimilated wind data from the British Atmospheric Data Center in the height range 0-55 km are used. In winter, maxima of the planetary wave intensity are observed near the tropopause and in the stratosphere. A decrease of the planetary wave intensity in the mesosphere coincides with the weakening of the stratospheric jet, and with the decay of the zonal flow in the mesosphere. Processes such as radiative suppression of planetary waves in the mesosphere and their additional reductions as a result of wave interactions and interactions with the zonal flow may explain these significant decreases of the intensity. Rotational spectra and estimates of rotational amplitudes in the height range of the middle atmosphere allow the investigation of the change of rotation direction of the horizontal wind vector dependent on height and period of the wave perturbations.

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